

ramis approximatis brevibus, iterum ramulosis, ramulis brevissimis, pedicellos 1-3 unifloros gerentibus.

This plant will be more fully described in my 'Contributions to Botany:—

Aristega lævifolia, nob.—Forsan ex India orientali: v. s. in herb. Hook. e musco Soc. Ind. orient. (hb. Helford).

[To be continued.]

XXII.—On the Recent Zoology and Palæontology of Victoria.

By FREDERICK M'COY, Professor of Natural Science in the University of Melbourne, Director of the National Museum of Victoria, &c.

To the Editors of the *Annals and Magazine of Natural History*.

GENTLEMEN,

I drew up the following brief notice on the above subject for our Intercolonial Exhibition, just held in Melbourne. If any part of it should seem fit for your pages, I beg to place it at your disposal.

I am, Gentlemen,
Your most obedient Servant,
FREDERICK M'COY.

In the following pages I shall only refer to those species of animals affording economically useful materials, or of some special present interest in relation to unsettled scientific questions.

ZOOLOGY.

MAMMALIA.

Very few of the Victorian quadrupeds are economically useful. The skins of the various kangaroos (*Macropus* and *Osphranter*), wallabies (*Halmaturus*), and wombats (*Phascolomys*) afford various qualities of leather, but are at present very little used; and for food the only portions of any native quadruped appearing in the market are the tails of the larger kangaroo, for soup. The flesh of the smaller kinds, as well as that of wombats, opossums (*Phalangista vulpina* and *P. viverrina*, var. *Victoriae**), hare-kangaroos, and kangaroo-rats (*Lagorchestes* and *Hypsiprymnus*)

* The common ring-tail opossum of Victoria has no specific relation to the rusty *P. Cooki* of New South Wales, and is constantly distinguishable from the *P. viverrina* of Tasmania, of which it is at least a variety which we may conveniently refer to under the name of *P. Victoriae*.

and bandicoots (*Perameles obesula* and *P. fasciata*), afford abundant food to the natives and wanderers lost in the bush.

The gigantic red kangaroo (*Osphranter rufus*) is only found towards the warm northern boundary of the colony, where it occurs in immense numbers, along with the rather rarer sooty kangaroo (*Macropus fuliginosus*) and the *Macropus ocydromus* of Gould, which is certainly a good and distinct species. These three species are replaced in the cooler southern part of Victoria by the *Macropus major*—the great "Old Man," or "Boomer" kangaroo, as the male is termed by the colonists. Since the new law increasing the fencing of the country taken up for pastoral purposes, the number of individuals of those species of kangaroo has increased prodigiously; so that hundreds are on occasions killed on some of the squatters' runs merely to save the grass for the sheep. The extensive poisoning of the native dog, or dingo, by strychnine also tends of late years to increase very greatly the numbers of the plant-eating animals. The wallabies of the southern part of the colony are the *Halmaturus uallabatus*, chiefly of the islands in Bass's Straits, on some of which *H. Bennetti* also occurs; and, curiously enough, I find that *H. brachyurus*, looked upon by Gould as a rare species of Western Australia, is the common species of the south-eastern portion of Victoria.

As some uncertainty seems to have been felt as to the occurrence of the genus *Molossus* in Victoria, it may be interesting to state that I have lately got some additional examples of the *M. australis* (now in the museum) from a hollow tree near Melbourne; so that there can be no doubt of the fact of the genus extending to Victoria, although the habitat is so abnormal.

Of seals two species are not uncommon—the eared seal (*Arctocephalus lobatus*) and the large spotted "sea-leopard" (*Stenorhynchus leptonyx*); but they are so much less abundant than formerly that sealing has been quite given up for many years. The fur of the Victorian fur-seal is of good quality when properly dressed. Fur rugs of beautiful softness, close and warm, and often of elegant appearance, are annually made in thousands from the skins of the opossum and the "native cat" (*Dasyurus viverrinus*), not only as carriage-wraps, but for use instead of blankets by the great number of people whose business leads them to sleep in the open air. So abundant and easily obtained are these skins that a profitable export trade might possibly result from their becoming better known to the European furriers.

Of CETACEA, a great number of the smaller-toothed sorts, of no economic value, may be seen on our coasts; but also, occa-

sionally, whalebone-whales of enormous size are stranded on the shores, and the oil and whalebone sent to market, without giving rise to any extensive whaling-expeditions into the southern waters. One of these whalebone-whales, 90 feet in length, was cast on our shores last winter, and I have secured the skeleton of it for our museum. It proves to be a new species of the genus *Physalus*, or "finner." The pectoral is about one-eighth of the total length, and the ribs are sixteen on each side, and there are about sixty vertebræ. It cannot be referred to the New-Zealand *Physalus antarcticus*, as the "baleen" is black. The largest blades of baleen are 18 inches wide at base, and 28 inches long. This species, of which I hope to publish a more detailed illustrated description shortly, I name *Physalus Grayi* (M'Coy), after my valued friend Dr. Gray, of the British Museum, whose researches on the Cetacea have so greatly aided and stimulated the recent investigations in this difficult branch of zoology. The whalebone of this whale, like that of the other "Finners," is only fit for splitting into the false bristles for brushes &c.

BIRDS.

As my friend Mr. Gould has recently published in his 'Handbook of the Birds of Australia' a list showing the geographical distribution of the species generally over the continent, I subjoin a list of those of Victoria, as the least-perfectly known of the colonies, and presenting several interesting modifications of Mr. Gould's list.

I would remark that the specimen of *Dendrocygna Eytoni* in the Melbourne Museum was purchased in the poultry-market, and seen by myself with the flesh untouched; so that there is no room for the doubt which has been expressed of the species occurring in Victoria. Another interesting species, the Indian and European little egret (*Herodias garzetta*), which is only doubtfully quoted by Mr. Gould as an Australian bird, I have carefully identified from a Gippsland specimen now in our Museum. The very rare *Pycnoptilus floccosus*, the locality of which Mr. Gould is not certain of, occurs not uncommonly in the dense brushes of the Yarra mountains. The new species of bristle-bird (*Sphenura Broadbenti*, M'Coy) is a very rare addition to this curious genus, easily distinguished by its rufous head from the previously known species. The *Pardalotus xanthopyge* (M'Coy) is a new species, brought under my notice by Mr. Leadbeater, and which seems to appear first in the north-west part of Victoria, and gradually to increase in numbers towards Adelaide, where it seems to replace the *P. punctatus*, with which it has previously been confounded.

LIST OF THE BIRDS OF VICTORIA

(Specimens of all of which are in the National Museum of Melbourne).

Ord. I. RAPTORES.

1. Fam. *Falconidæ*.

Aquila audax.
Polioaëtus leucogaster.
Falco hypoleucus.
 — *melanogenys*.
 — *subuiger*.
 — *lunulatus*.
Hieracidea berigora.
 — *occidentalis*.
Tinnunculus cenchroides.
Leucospiza Raii.
 — *Novæ Hollandiæ (albino)*.
Astur approximans.
 — *cruentus*.
Accipiter torquatus.
Milvus affinis.
Elanus axillaris.
 — *scriptus*.
Circus assimilis.
 — *Jardinii*.

2. Fam. *Strigidæ*.

Strix Novæ Hollandiæ.
 — *tenebricosus*.
 — *delicatus*.
Hieracoglaux strenuus.
 — *connivens*.
Spiloglaux boobook.

Ord. II. INSESSORES.

1. Fam. *Caprimulgidæ*.

Ægotheles Novæ Hollandiæ.
Podargus strigoides.
 — *brachypterus*.
Eurostopodus albugularis.

2. Fam. *Cypselidæ*.

Chætura caudacuta.
Cypselus pacificus.

3. Fam. *Hirundinidæ*.

Hirundo frontalis.
Hylochelidon nigricans.
Cheramœca leucosterna.

4. Fam. *Meropidæ*.
Merops ornatus.

6. Fam. *Alcedinidæ*.

Dacelo gigas.
Todiramphus sanctus.
 — *pyrrhopygius*.

Alyone azurea.

7. Fam. *Artamidæ*.

Artamus sordidus.
 — *personatus*.
 — *superciliosus*.
 — *leucopygialis*.

8. Fam. *Ampelidæ*.

Pardalotus striatus.
 — *punctatus*.
 — *affinis*.
 — *xanthopyge (M'Coy)*.

9. Fam. *Laniadæ*.

Strepera graculina.
 — *anaphonensis*.
Gymnorhina tibicen.
 — *leuconota*.
Cracticus torquatus.

10. Fam. — ?

Grallina picata.

11. Fam. *Campephagidæ*.

Graucalus melanops.
 — *mentalis*.
Pteropodocys phasianella.
Campephaga Jardini.
 — *humeralis*.
Pachycephala glaucura.
 — *melanura*.
 — *rufiventris*.
 — *rufogularis*.
 — *olivacea*.
Colluricincla harmonica.
Falcunculus frontatus.
Oreoïca cristata.

12. Fam. *Dicruridæ*.

Chibia bracteata.

13. Fam. *Muscicapidæ*.

Rhipidura albiscapa.
 — *ruffrons*.
Sauloprocta motacilloides.
Seisura inquieta.
Piezorhynchus nitidus.
Myiagra plumbea.
 — *concinna*.
 — *nitida*.
Microœca fascians.
Monarcha carinata.
 — *trivirgata*.

14. Fam. — ?

Smicrorhis brevirostris.

15. Fam. *Saxicolidae*.

Erythrodryas rhodinogaster.

Petroica multicolor.

— *Goodenovii*.

— *phoenicea*.

Melanodryas cucullata.

Eopsaltria australis.

16. Fam. *Menuridae*.

Menura superba.

Psophodes crepitans.

17. Fam. — ?

Malurus cyaneus.

— *melanotos*.

Stipiturus malachurus.

Sphenura Broadbenti (M'Coy).

Pycnoptilus floccosus.

Cisticola exilis.

— *lineocapilla*.

— *ruficeps*.

Sericornis ocellans.

Acanthiza diemenensis.

— *nana*.

— *lineata*.

Geobasileus chrysorrhous.

Ephthianura albifrons.

— *tricolor*.

— *aurifrons*.

Calamanthus fuliginosus.

Chthonicola sagittata.

18. Fam. *Motacillidae*.

Anthus australis.

Cincloramphus cantillans.

Ptenocedus rufescens.

19. Fam. — ?

Sphenceacus gramineus.

20. Fam. *Sylviidae*.

Calamoherpe australis.

Mirafrja Horsfieldii.

21. Fam. *Fringillidae*.

Zonæginthus bellus.

Ægintha temporalis.

Stagonopleura guttata.

22. Fam. *Merulidae*.

Cinclosoma punctatum.

— *castaneonotum*.

Oreocincla lunulata.

23. Fam. *Paradiseidae*.

Ptilonorhynchus holosericeus.

Chlamydodera maculata.

Mimeta viridis.

24. Fam. — ?

Corcorax melanorhamphus.

26. Fam. *Corvidae*.

Corvus australis.

28. Fam. *Crateropodidae*.

Pomatostomos temporalis.

— *superciliosus*.

— *ruficeps*.

29. Fam. *Meliphagidae*.

Meliornis longirostris.

Lichmera australasiana.

Glyciphila fulvifrons.

— *albifrons*.

Ptilotis Lewinii.

— *leucotis*.

— *auricomis*.

— *ornata*.

— *penicillata*.

— *fusca*.

— *chrysops*.

Plectorhyncha lanceolata.

Meliphaga phrygia.

Entomophila picta.

Anthochaera carunculata.

Anellobia mellivora.

— *lunulata*.

Tropidorhynchus corniculatus.

— *citreogularis*.

Acanthorhynchus tenuirostris.

Myzomela sanguinolenta.

— *nigra*.

Entomyza cyanotis.

Melithreptus gularis.

— *lunulatus*.

Myzantha garrula.

Manorhina melanophrys.

Dicaeum hirundinaceum.

30. Fam. — ?

Zosterops caeruleus.

32. Fam. *Certhiidae*.

Climacteris scandens.

— *erythroptera*.

— *leucoptera*.

Sittella chrysoptera.

33. Fam. *Cuculidæ*.

Cacomantis pallidus.
 — *flabelliformis*.
 — *insperatus*.
Lamprococeyx plagosus.

34. Fam. *Psittacidæ*.

Cacatua galerita.
 — *Leadbeateri*.
 — *roseicapilla*.
Licmetis tenuirostris.
Calyptorhynchus Leachii.
 — *funereus*.
 — *naso*.
Callocephalum galeatum.
Polytelis Barrabandi.
 — *melanura*.
Aprosmictus scapulatus.
Platycercus Pennantii.
 — *adelaidensis*.
 — *zonarius*.
 — *flaveolus*.
 — *eximius*.
Psephotus hæmatorrhous.
 — *hæmatonotus*.
Euphema chrysostris.
 — *elegans*.
 — *aurantia*.
 — *pulchella*.
 — *Bourkii*.
Melopsittacus undulatus.
Calopsitta Novæ Hollandiæ.
Pezoporus formosus.
Lathamus discolor.
Trichoglossus multicolor.
 — *chlorolepidotus*.
Glossospitta australis.
 — *porphyrocephala*.
 — *pusilla*.

Ord. III. RASORES.

1. Fam. *Columbidæ*.

Phaps chalcoptera.
 — *elegans*.
Ocyphaps lophotes.
Geopelia tranquilla.
Stictopelia cuneata.

2. Fam. *Megapodidæ*.

Leipoa ocellata.

3. Fam. *Turnicidæ*.

Turnix varia.
 — *scintillans*.
 — *velox*.
 — *pyrrhothorax*.
Pedionomus torquatus.

4. Fam. *Perdiciidæ*.

Coturnix pectoralis.
Synoicus australis.
 — *diemenensis*.
 — *sordidus*.
Excalfactoria australis.

Ord. IV. GRALLATORES.

1. Fam. *Struthionidæ*.

Dromaius Novæ Hollandiæ.

2. Fam. *Otitidæ*.

Chloriotis australis.

3. Fam. *Charadriadæ*.

Edicnemus grallarius.
Hæmatopus longirostris.
 — *fuliginosus*.
Lobivanellus lobatus.
Sarciophorus pectoralis.
Charadrius orientalis.
Eudromias australis.
Cirripidesmus asiaticus.
Ægialites monacha.
 — *nigrifrons*.
Erythrogonys cinctus.
Ochthodromus inornatus.
 — *bicinctus*.

5. Fam. *Himantopidæ*.

Himantopus leucocephalus.
Cladorhynchus pectoralis.

6. Fam. *Recurvirostridæ*.

Recurvirostra rubricollis.

7. Fam. *Limosidæ*.

Limosa melanuroides.
 — *uropygialis*.

8. Fam. *Tringidæ*.

Limnocinclus acuminatus.
Ancylochilus subarquatus.
Actodromas australis.
Glottis glottoides.

9. Fam. *Scolopacidæ*.

Gallinago australis.
Rhynchæa australis.

10. Fam. — ?

Numenius cyanopus.

11. Fam. *Tantalidæ*.

Carphibis spinicollis.
Threskiornis strictipennis.
Falcinellus igneus.
Platalea regia.
Platibis flavipes.

12. Fam. *Gruidæ*.

Grus australasianus.

14. Fam. *Ardeidæ*.

Ardea pacifica.

Herodias alba.

— *egrettoides*.

— *garzetta*.

Demiegretta Grayi.

Nycticorax caledonicus.

Botaurus poiciloptilus.

Butoroides flavicollis.

Ardetta pusilla.

15. Fam. *Rallidæ*.

Porphyrio melanotus.

Tribonyx ventralis.

Gallinula tenebrosa.

Fulica australis.

Hypotænidia philippensis.

Rallus brachypus.

Porzana fluminea.

— *palustris*.

— *tabuensis*.

Ord. V. NATATORES.

1. Fam. *Anatidæ*.

Chenopsis atrata.

Cereopsis Novæ Hollandiæ.

Anseranas melanoleuca.

Chlamydochen jubata.

Casarca tadornoides.

Anas superciliosa.

— *punctata*.

Stictonetta nævosa.

Spatula rhynchotis.

Malacorhynchus membranaceus.

Dendrocygna Eytoni.

Nyroca australis.

Erismatura australis.

Biziura lobata.

2. Fam. *Laridæ*.

Larus pacificus.

Bruchigavia Jamesonii.

3. Fam. *Sternidæ*.

Sylochelidon caspia.

Thalasseus poliocercus.

Sternula nereis.

Hydrochelidon leucopareia.

4. Fam. *Procellariidæ*.

Diomedea exulans.

— *cauta*.

— *culminata*.

Phœbetria fuliginosa.

Ossifraga gigantea.

Nectris brevicauda.

Daption capensis.

Prion turtur.

Pelagodroma fregata.

Haladroma urinatrix.

5. Fam. *Pelecanidæ*.

Pelecanus conspicillatus.

Phalacrocorax Novæ Hollandiæ.

— *leucogaster*.

— *melanoleucus*.

— *stictocephalus*.

Plotus Novæ Hollandiæ.

Tachypetes aquila.

Sula australis.

6. Fam. *Podicipidæ*.

Podiceps australis.

— *Nestor*.

— *gularis*.

7. Fam. *Spheniscidæ*.

Eudyptula undina.

Chrysocoma catarractes.

REPTILIA.

Of this division of the animal kingdom there are scarcely any Victorian forms of economic importance. The edible "green" turtle (*Chelonia viridis*) is a very rare visitor to our shores, two examples being all that I have any knowledge of, both now in the museum. An example of the leathery turtle (*Sphargis coriacea*), caught at Portland, on our west coast, gives the most southern range of the species known. Our two freshwater Chelonians, *Chelodina oblonga* and *C. longicollis*, are only found in the rivers towards the northern boundary of Victoria, where

they are common. Of these a kind of turtle-soup was made at the dinner of the Melbourne Acclimatization Society; but the taste for it has not yet been acquired.

The CROCODILIA do not come down the Australian coast so far south as Victoria, the largest of the Sauria being the *Hydrosaurus varius*, called "iguana" by the colonists, of five or six feet. Of the skin of this species some slippers and other small articles in the Intercolonial Exhibition now open in Melbourne are manufactured with much elegance. The natives use it for food. The *Trachydosaurus rugosus*, *Cyclodus gigas*, *Hinnulia tæniolata*, and *Grammatophora barbata* abound in the warmer north part of the colony, but gradually disappear towards the south coast.

Of snakes, the following species occur, and the larger and more common are roasted and eaten by the natives;—*Morelia variegata*, or carpet-snake, the only Python and non-venomous snake in Victoria, and confined to the northern boundary; *Acanthophis antarctica*, or "death-adder," also confined to the northern boundary; *Hoplocephalus curtus*, or "tiger snake," common about Melbourne, and the cause of most of the accidents from snake-bites; *H. flagellum*, or "little whipsnake," *H. coronoides*, and *H. superbus*. This latter species, with fifteen rows of scales, the two outer rows with red centres, is very common about Prahran, near Melbourne, though said to occur only in Tasmania; the neck is not dilatible into a flat hood, as in the *H. curtus*. The "black snake" (*Pseudechis porphyraicus*) is rather rare; and the *P. australis* is only found with us near our northern boundary. The common "brown snake" may possibly include two species; but I doubt the distinctions between *Pseudonaja nuchalis* and *Diemenia superciliaris* being permanent; at any rate, specimens with the proportions of the rostral shield of the latter are common, and several intermediate proportions varying to that characteristic of the former occur. *Diemenia reticulata* is very common on the Lower Murray boundary.

The BATRACHIA, with the exception of the common green frog (*Ranhyala aurea*) are rarely seen or heard,—the true tree-frogs (*Hyla*) inhabiting the lofty gum-trees, and the *Lymnodynastes tasmanicus*, *L. dorsalis*, and *L. affinis* burrowing in the sand during the day.

PISCES.

The species of fish good for the table are very much fewer in Victoria than in Europe; and great interest attaches, therefore, with many of the general public, to the endeavours of the

Acclimatization Society of Victoria to introduce the salmon and other good British fish into the waters of the colony, independently of the scientific interest of the experiment. Large English trout are now in considerable numbers, from ova imported, packed in ice, by our Victorian Acclimatization Society, acting in conjunction with the Tasmanian government. Not only were numbers of parr hatched in the Victorian and Tasmanian rivers from the salmon-ova imported in this way, but there is now in the Exhibition one caught a few weeks ago in the Tamar River, about ten inches in length, which has lost the marks of the parr, and assumed the bright silvery aspect of the migratory stage of development, or "grilse." This is a great success for acclimatization and pisciculture, and shows that none of the insuperable difficulties which were supposed in England to bar our success with the Salmonidæ really exist, but that food and climate, and quality of water of such of our rivers as flow all the year, are sufficiently suitable to permit of success.

The cartilaginous fishes are supposed to be so abundant here as greatly to diminish the chance of the acclimatized salmon returning in safety from the sea; but I do not think they are as numerous as in Britain.

The *Callorhynchus antarctica*, or Southern Chimera, is common near Portland, at short distances from the shore; and all round our coast the Port-Jackson shark, or "bulldog shark," as it is called by the colonists (*Cestracion (Heterodontus) Philippi*), is not uncommon. The most beautiful and curious of our sharks is that called "carpet shark" by the colonists—the *Crossorhinus barbatus*. The largest of our sharks, the "black-finned shark" (*Carcharias melanopterus*), is so rare that I have seen only one specimen (fifteen feet long), from Hobson's Bay. The European "hammer-headed shark" (*Sphyrnias zygena*) is not very uncommon. But, what is very curious, we find the common English "tope" (*Galeus canus*) common in the bay; and, more extraordinary still, the common English "smooth-hound" (*Mustelus vulgaris*) is the commonest dogfish or small shark of our coast, occurring in great numbers in Hobson's Bay, undistinguishable from Cornish specimens. The large *Odontaspis taurus* is, perhaps our commonest large and very destructive species, although the Indian *Heptranchus indicus* is not uncommon also. Another large shark, perfectly identical with the English species, is the "angelfish" (*Squatina vulgaris*), not very uncommon. Intermediate between the sharks and rays we have the tentaculated "sawfish" (*Pristiophorus cirratus*) in abundance, and the rare *Trigonorhina fasciata*. These, with one or two rays (*Raja Lemprieri* &c.), two large "sting rays" (*Trygon*), and a rare *Cephaloptera*, are the chief predaceous Chondropterygii. One

small lamprey is not uncommon in the Murray, and another (*Mordacia*) in the Saltwater River.

Of bony fish there are numerous genera and species; of these I need only now advert to a few used for food or otherwise interesting. Of the Percidæ one of the very best table fish is the *Lates colonorum*, or "Gippsland perch," which has appeared of late years in the market. Also of this family is our most gigantic river-fish, the "Murray cod-perch" (*Oligorus macquariensis*), which is often three feet long and upwards of twenty pounds weight; it is perhaps the most commonly seen at table of all the Victorian fish, although not at all the best; it is now brought to the Melbourne markets in great numbers by the railway. The next example is the most abundant and cheapest of the marine fish, never seen at the best tables, but used very extensively as food by the poorer people. It has the reputation of very frequently causing, even when perfectly fresh, the most violent symptoms of fish-poisoning, accompanied by a peculiar redness of the face and great suffering, sometimes ending in death—although so irregular in its action that other persons eating of the same fish have experienced no ill effects. It is the *Arripis georgianus*, and is called by the fishermen "salmon" when old and of a uniform olive tint, and "salmon trout" in the younger spotted stage of growth. I have no doubt the *Centropristis georgianus* (C. & V.), *C. salar* (Rich.), *C. truttaceus* (C. & V.), and *Perca marginata* (C. & V.) are all synonyms of this one common species. An excellent river-fish of this family is the *Dules ambiguus* of the Murray; it is popularly known as the "Murray golden perch," or sometimes "Murray golden carp," and far exceeds in general estimation any of the other freshwater fish for the table. Of the Pristipomatidæ the Murray River affords an excellent table fish, the *Therapon ellipticus*, known in the market and to the colonists generally as the "Murray silver perch," and it is now brought to Melbourne in great numbers by railway.

Amongst the mullets (*Mullidæ*) we have a representative of the European red mullet, forming an equally delicious delicacy when cooked in the same way; it is the Australian red mullet, the *Upeneichthys porosus*, which, like its home representative, is only occasionally found, and must be considered a rarity. The family Sparidæ affords the most important fish for the table found in the Victorian seas, when we take its size (occasionally reaching twenty pounds weight), abundance, and excellence together into account; it is the *Pagrus unicolor*, or "snapper" of the colonists: and to this family also belongs one of the most popular fishes with the anglers in the mouths of the rivers near Melbourne, as giving good sport and forming an agreeable ad-

dition to the dinner table: it is the "bream" of the colonists, the *Chrysophrys australis*. The *Chironemus marmoratus* is not uncommon in the market: I have heard the name "carpet-fish" applied to it; but I may here remark that the community is so new that the vulgar or popular names are not to be relied upon as in older countries, and vary irregularly within short distances. A nearly allied fish, universally known as the "butter-fish," and often found at table, although not very good, is the *Chilodactylus nigricans*: the uniform colour supposed by authors to characterize this species only occurs in the nearly adult examples, I find; and the young are marbled with brown and bluish grey. The *Chilodactylus macropterus*, although common in the market, seems to have no common name. The finest of all the Australian marine fishes for the table is the "trumpeter" of the colonists, formerly supposed to be confined to Tasmania, but now found so abundantly on some fishing-banks in the track of the steamers plying to Melbourne that at certain seasons it is abundant in the Victorian markets: it is the *Latris hecateia*. Several species of *Platycephalus*, of which *P. tasmanius* and *P. levigatus* are the most common, are confounded under the common popular name of "flat-head," given to the commonest edible fish of the Victorian coasts—found abundantly and easily caught by line all the year round: these are eaten by people living on the coasts, and are always in the market, but not good enough to be held in any esteem for the table. Of "gurnets," the beautiful *Lepidotrigla vanessa* and the *Trigla kumu* and *Trigla polyommata* are not uncommon occasional visitors, but more noted for their extraordinary beauty than as food, for which I have not known them used. In the family Trachinidæ, several species of *Uranoscopidæ*, vulgarly called "stone-lifters," of which the *Kathetostoma lave* is the commonest, occur on our shores, but are not used for food. Of the same family, however, there is one fish, called "whiting" by the colonists (although not at all like the European fish of that name), very abundant, always in the market, and so good as to be found at the best tables usually: it is the *Sillago punctata*. Of the family Scïenidæ, one example is a not uncommon occasional visitor, an exceedingly fine fish, of excellent quality for the table, and often four feet in length; it is called "king-fish" by the Melbourne fishermen and dealers: I believe it to be perfectly identical with the "maigre" of the Mediterranean and Cape of Good Hope—the *Sciæna aquilâ*. Of the family Sphyrænidæ a tolerably good table fish is very common at times in the markets: it is the "pike" of the colonists, *Sphyræna Novæ Hollandiæ*. Of the allied family Trichiuridæ an equally abundant and even larger fish is found in great numbers in the market at

certain seasons—the “barracouta,” perfectly identical with the *Thersites atun* of the Cape; it is one of the few fish dried and preserved in large quantities in Victoria. Of the Scombridæ, the only true Mackerel are rare visitors, the *Scomber australasicus* having only occurred to me twice in several years, and the *S. pneumatophoris* very lately; but of the tunny we have a new species, *Thynnus australis* (M'Coy), a not uncommon visitor; and the *Echeneis remora* is occasionally found in Hobson's Bay. The true dory (*Zeus faber*), perfectly identical with Mediterranean specimens, is a not very uncommon straggler into our seas; but in fish-markets the infinitely inferior table fish, the Australian “boarfish” (*Histioporus recurvirostris*), is constantly sold under this name, although easily distinguished from the dory, even by unscientific purchasers, by the want of the round dark spot in the middle of the sides. The *Cyttus* (*Capros*) *australis* is common, but too small to be used for the table. Of the allied family Carangidæ, many interesting species occur in our seas. The common “horse-mackerel” (*Trachurus trachurus*), perfectly identical with English specimens, appears occasionally; and the *Caranx georgianus*, under the name of “silverfish,” is still more common. A fine species of *Seriola*, nearly three feet long, is occasionally caught in numbers, and is sometimes called by the fishmongers “yellow tail,” as at St. Helena; and sometimes it is sold and noticed in the newspapers under the name of “Bonito,” with which its size and quality of flesh caused them to confound it; it differs only in small details from the *Seriola Lalandi*, of which I believe it to be a mere trifling variety. A curious instance of an almost cosmopolitan fish of this same family (Carangidæ) is the “skipjack” (*Temnodon saltator*), of which I have obtained many specimens in Hobson's Bay exactly identical with examples from New York, or the West Indies, or the Cape of Good Hope. There are many small species of *Gobius*, *Callionymus*, and *Blennius*, many of the latter viviparous; but they are not specially interesting or important. The *Clinus despicillatus* and *Cristiceps* abound amongst the seaweed between high- and low-water marks. The gourami (*Osphromenus olfax*) has been introduced and lived in a pond in my botanic garden at the university for nearly two years, until devoured by the herons; and it also lived in the ponds of the Acclimatization Society long enough to show that the experiment of the acclimatization of this famous table fish may be expected to succeed in ponds or tanks favourably placed. Two species of *Atherina* and two of *Mugil* are not uncommon in the bay; but the commonest “mullet” found abundantly in the fish-market for the table is the *Agonostoma Forsteri*. Two species of *Glyphidodon* or *Melambaphes* are common, and may often be found

in the market, although not very good for the table: these are the *M. (Glyphidodon) nigroris*, called the "black perch," and the *Glyphidodon Victoriae*, commonly called the "rock perch." The *Parma squamipennis* has occurred also to me not very uncommonly in the bay. Several brilliantly coloured fish of the family Labridæ occur as rare occasional visitors, but they are not worth special notice, the commonest and best-known being that called "parrot-fish;" it is the *Labrichthys ephippium*. The *Labrichthys laticlavus*, *L. psittacula*, and several others also occur occasionally. A much esteemed fish in the Yarra and other Victorian rivers is called "black fish" by the colonists; it is abundant, and sometimes exceeds a foot in length: it belongs to the genus *Gadopsis*, so remarkable for combining a spiny first dorsal fin with all the other characteristics of the *Anacanthini*; it is a mere variety, apparently, of the fish called "freshwater trout" in the Tasmanian rivers, the *Gadopsis marmoratus*. The *Lotella callarias* is a rare visitor, confounded with the *Pseudophycis barbatus* and two other species of *Pseudophycis* under the common name of "cod" and "rock cod" by the fish-dealers. The "flounder" of the colonists is a good table fish, with which the market is now regularly supplied; it seems peculiar to these seas, and is the *Rhombosolea flesoides*. A true sole (*Solea*), nearly allied to the *Solea margaritifera*, also occurs, although rarely, at the Heads. Amongst the Siluroid fishes the most important is the *Copidoglanis tandanus*, which is now regularly supplied to the Melbourne market by railway from the river Murray, under the name of "Murray catfish." The Yarra Yarra and some other of the rivers near the southern coast contain in great abundance a beautiful and active fish, excellent for the table, and affording capital sport to the angler. By ichthyologists following the classification of Cuvier it would be referred to the Salmonidæ, the adipose second dorsal fin being well marked; and so much does it resemble a grayling, in the cucumber smell when caught, in general appearance, habits, mode of rising to the fly, and playing, as well as in flavour, that anglers are in the habit of calling it now the "Australian grayling;" its close resemblance in food and habits to the true Salmonidæ helped the Acclimatization Society to argue that certain of our rivers would serve for the experiment of acclimatizing the European salmon and trout, and, as experience has since shown, successfully; it is vulgarly also called the "Yarra herring," and is the *Prototroctes maræna*. There is only one other fish known in Victoria with the second adipose dorsal fin and other characteristics of the Cuvierian Salmonidæ (but now referred to the Scopelidæ); it is the large and beautifully coloured marine form, the *Auopus purpurisatus*, of which I have

got four specimens from Hobson's Bay for the museum; it is too rare, however, to have a popular name or be eaten.

Of the family Clupeidæ, or herrings, there is only one of much importance in our seas. A specimen of this was first brought to me in August 1864, from a small shoal, then seen for the first time in Hobson's Bay, and quite unknown to the fishermen. It was supposed by the sender to be the "Yarra herring" or "grayling" gone out to sea; but, on examination, I found it was the *Clupea melanosticta* of Temminck, or the species of pilchard so abundant on the shores of Japan. In the same month in the succeeding year, they appeared in greater abundance in the bay, and were caught by thousands for the market. After remaining for a few weeks they disappeared until the same time in 1866, when they arrived in such countless thousands that carts were filled with them by simply dipping them out of the sea with large baskets; hundreds of tons of them were sent up the country to the inland market, and through the city for several weeks they were sold for a few pence the bucketful; while the captains of ships entering the bay reported having passed through closely packed shoals of them for miles. They may probably be now expected every year as a very important addition to the food-fishes of the country. I imagine some alteration of the bed of the sea, from the earthquake disturbances north of Australia about that time, may have facilitated or induced the extension of the shoals in such unusual quantities from Japan to our coasts. Duperrey (or Lesson and Garnot) found it in New Zealand; and Cuvier and Valenciennes referred their specimen to the genus *Alausa*. I find, however, that the authors of the 'Histoire des Poissons' were in error, and Temminck in the right, in the former assigning five, and the latter seven, gill-rays; and it has also a row of teeth on the tongue, as was correctly stated by Temminck and erroneously denied by Cuvier and Valenciennes. The fish is therefore a *Meletta*, and not an *Alausa*, and should be referred to as the *Meletta melanosticta* (Temm. sp.). A true anchovy I find in great abundance in Hobson's Bay; it is the *Engraulis australis* (Wh. sp.); and if identical, as Cuvier supposes, with all the synonyms he groups under his *E. Brownii*, would be almost a cosmopolitan species. The *Chatoesus come* is occasionally to be found in the market. Of the family Galaxidæ are several interesting species in our rivers, going under the vulgar names of "gudgeon" and "trout." The species of *Galaxias* bearing the latter name in the Yarra and the Gippsland rivers is a beautiful new species, *Galaxias ocellatus* (M'Coy), marked with large circular eye-like spots, representing closely the *G. truttaceus* of Tasmania. The species called popularly "gudgeon" in the Yarra is the *Galaxias*

pseudoscriba (M'Coy), related to the *G. scriba* (Cuv. and Val.), but with the depth of the body one-eighth of the total length, and other differences of proportion. The family Murænidæ, or eels, is represented in the bay by a large congor; and the *Anguilla australis* is the extremely abundant eel of the Yarra, Saltwater River, and many other streams and the adjacent swamps filled by them. Of the family Balistidæ there are a great number of species, all going under the popular name of "leather-jackets," having the reputation of being poisonous, and of no economic value. Of the family Tetraodontidæ, the *Tetraodon Hamiltoni* is extremely abundant along the shores, and popularly called "toadfish."

MOLLUSCA.

There are scarcely any molluscous animals of economic importance in the colony, the two species of oysters used for food being imported from Sydney of late years. The *Venus strigosa* is sold in the fish-shops under the erroneous name of "cockle;" and the *Lunetta undulata* is eaten by persons near the coast under the equally erroneous name of "winkles."

ARTICULATA.

Of the articulated animals there are only a few Crustacea applied to any use. The great Murray-River crayfish or lobster (*Astacoides serratus*) is brought in great numbers with the Murray fish by railway now to market, and is generally used at table as the lobster is in Europe. The smaller river crayfish (*Astacoides quinquecarinatus*) is not sold in the markets, but is commonly eaten in the vicinity of the many streams and reservoirs in which it is found in abundance. The great marine spiny crayfish or lobster, found abundantly at the Heads, is constantly found in the shops, and used at table in salads &c.; it seems to be a variety of the *Homarus annulicornis*, or a very closely allied species. A most destructive enemy to the submarine timbers of our piers belongs to this division of the animal kingdom: it is the little *Mylostoma* or *Chelura*, multiplying in the timbers, and causing them to crumble to pieces, as in Europe. Of the Insecta no species are used for any useful purpose at present, although several species of the *Coccus* affording dyes abound. Of the Annulata almost the only useful form is the species of leech (*Hirudo*) found so abundantly in the Murray River, which has the mouth so nearly like that of the *H. officinalis* of Europe that it is collected and used in immense quantities for medical purposes.

RADIATA AND PROTOZOA.

Of these divisions there are no economically useful kinds known, a few sponges alone having been applied to any useful purpose.

PALÆONTOLOGY.

The palæontology of Victoria and the adjacent parts of Australia is of very great interest, from the many unsettled scientific questions on which it bears.

POST-PLIOCENE AND PLIOCENE PERIODS.

The most recent geological period in Victoria, as in Europe, may be illustrated by the remains of bones found in caverns and in the superficial drifts and clays deposited, apparently, at the same time as that at which the caverns became closed. These Pleistocene and newer Pliocene periods are in Victoria, as in Europe, remarkably rich in osseous remains of warm-blooded animals, some of which are still inhabitants of the spot; others still live, but in other countries; and many are extinct—generally of the same type of structure as the more characteristic living animals of the country, but of species frequently immensely superior in size to any that now live—repeating, in fact, in Australia that appearance of gigantic antitypes of the peculiar geographical groups of zoological structure marking the living zoology of the great regions of the earth at the present day. I believe the majority of the so-called alluvial gold-deposits to be of this newer Pliocene period. In the sinkings into the various drifts at the Ballarat gold-fields, remains of timber and the characteristic fruits of the *Banksia* or “honey-suckle”-trees of the colonists are common, and apparently of the species still growing in the vicinity. In the clay-beds leaves are occasionally found in abundance, and perfectly preserved, undistinguishable from the foliage of the common “stringy-bark” tree (*Eucalyptus obliqua*) of the neighbouring forests. In these gold-drifts no marine remains have yet been found, and, indeed, few fossils of any kind; but in some of them (as, for instance in the gold-“cement” of Dunolly) I have found the jaw of a wombat, of the generic type (*Phascolomys*) so characteristic of the southern part of Australia and the adjacent island of Tasmania, but forming a distinct species (*Phascolomys pliocenens*, M'Coy), easily distinguished from the three living species of the same size by the greater antero-posterior length of the grinders. In the living and fossil lower jaws, having the same length from the tip of the incisor to the back of the hindermost grinder, the whole grinding series, of one premolar and four molars, only

measures as much as the four molars of the fossil species, the premolar of which thus stands entirely in front of the corresponding tooth in the three living ones of the same size. This wombat enables me thus to connect the gold-drifts in age with the more superficial red clays, in which the bones of the lake-timboon &c. are found. And here we find, with the living dingo, or native wild dog, inhabiting the neighbouring localities at present, skulls and teeth of the *Sarcophilus ursinus*, or "Tasmanian devil," which now is only known to exist in Tasmania, and has never been known on the mainland; with these are the bones and teeth of the gigantic extinct kangaroos (the *Macropus Titan* and the *M. Atlas*), as well as bones and teeth of the gigantic extinct genera *Nototherium* and *Diprotodon*. The species of the latter occurring in Victoria is quite distinct from those of the more northern parts of the continent; it is the *Diprotodon longiceps* (M'Coy), readily distinguished by the more slender, elongate proportion of the jaws. The ordinary gold-drifts of Victoria, from the association (more or less direct) with these fossils, may thus be taken to be of the newer Pliocene or Mammaliferous Crag period, like those of Russia, determined by Sir R. Murchison.

MIOCENE PERIOD.

Under the Pleistocene and Pliocene deposits above alluded to are a series of plant-beds in a few localities, with a totally different facies from the recent flora of the country, not one species being identical; nor are the characteristic genera represented, but an entirely extinct series of species having generic and general resemblance to the foliage of Asiatic plants of tropical types of dicotyledonous plants, of which the *Laurus* is the most conspicuous. Many of the forms are closely allied to those of the Miocene plant-beds of the Rhine country. In apparently the same position, in much more numerous localities, the marine deposits of sands and clays full of shells, echinoderms, corals, with occasional fish, and with still rarer marine mammalian remains, occupy wide areas just under the Pliocene beds. These have the general facies (and even specific identity) of so many species so clearly marked, that there cannot be the slightest doubt of the great thickness of those beds being lower Miocene of the date and general character of the Faluns of Touraine, the Bordeaux and the Malta beds, while the base of the series blends imperceptibly with a series of beds having a slightly older facies, and rendering the adoption of the Oligocene formation of Beyrich as convenient for Victorian as for European geologists. The only marine mammal of which I have seen portions which could be identified in those beds is a new species of *Squalodon*

or *Phocodon* (*P. Wilkinsoni*, M'Coy), from the Miocene Tertiary sands of the Cape Otway coast: and as the genus is only known in Miocene strata of Malta and the French falun, the occurrence of a new species of so restricted a genus is not only valuable as an addition to palæontology, but an interesting fact as showing that the zoology of Australia, as I have on former occasions endeavoured (contrary to received opinions) to establish, was not, during the older Tertiary period, of the isolated exceptional character it now has, but was then closely related generically, and even specifically, as I shall show, to that of many parts of Europe and America. The molar teeth of *P. Wilkinsoni* are smaller than the Maltese *P. scillæ*, and agree most nearly with the *Squalodon* (*Phacodon*) *Grateloupi* (Meyer) of the Miocene beds near Bordeaux, from which the Australian species differs chiefly in smaller size, some details of proportions, and the relatively larger roots, indicating a greater depth of jaw. In these same beds remains of fish are not uncommon; and these are almost all of well-known European and American Miocene and Upper Eocene Tertiary extinct species of Plagiostomi: the most abundant widely distributed species is, I have no doubt, perfectly identical with the *Carcharodon angustidens* (Ag.) of the Bünde and other well-marked European Lower Miocene and Oligocene beds. The *C. megalodon* (Ag.) is an almost equally common Australian Miocene species, and (on comparison, as in the former case, of specimens) undoubtedly identical with the Lower Miocene and Oligocene Tertiary specimens from Malta, Bünde, and other European sections, and with those from the Eocene London Clay and North-American localities. The *Otodus Desori* (Ag.), *Lamna elegans* (Ag.), and *L. contortidens* (Ag.), of the European and United-States Miocene localities, are also common in many of our Victorian Miocene beds, in which I have also identified the *Lamna denticulata* (Ag.), and the large teeth of *Oxyrhina trigonodon* (Ag.), exactly agreeing with those of the Lower Miocene beds of the Rhine country. Along with these entirely extinct plants, mammals, and fish, there are many genera and species of Mollusca entirely extinct, many identical with extinct species of the same geological age in other localities both in Europe and North America, and many of the commonest forms are identical with living species, none of which are found in the adjacent seas of Victoria, but in the warmer seas north of New Zealand, Philippines, and South Africa), with one or two rare exceptions of species extending into colder latitudes in the northern hemisphere.

A fine new *Aturia* (*A. australis*, M'Coy) is the most common and important of the fossil Cephalopoda, closely related to the *Aturia ziczac* of the Lower Miocene and Upper Eocene beds

of Germany, France, and England. No species of *Aturia* lives now, the angulated septa contrasting strongly with the waved ones of recent *Nautilus*.

The Gasteropoda are very abundant and for the most part peculiar, several of them being closely representative types of well-known Miocene and Eocene European species, while others are identical with European and North-American Miocene and Upper Eocene species. Of these, one of the most striking is a *Dentalium* found in extraordinary abundance in nearly every locality of our Victorian Miocene Tertiaries; and yet no species of the genus has ever been found living in the Victorian seas. The fossil species is manifestly identical with the Belgian Miocene Tertiary *D. Kickxii*; and the Victorian examples also agree completely, on the most minute comparison, with specimens I have from the Lower Miocene and Oligocene beds of Flonheim, as well as with North-American specimens I have from the Upper Eocene beds of Vicksburg, described by Conrad under the name *D. mississippiense*, without observing its identity with the European Miocene species. This *Dentalium*, occurring together with the above-named extinct species of fish so abundantly in Australia, as in the United States, France, and Germany, is a very curious additional instance of the general identity in facies of the marine zoology of Australia with that of Europe and Northern America during the Miocene period, when all of these localities seem to have had a warmer climate than at present. Amongst the representative types the most extraordinary case is that of an entire series of *Volutes* in the Oligocene clay-beds near Mount Martha and Mount Eliza on one side of Hobson's Bay, and the sandy beds of slightly younger age on the other side of the bay south of Geelong, representing in the most complete manner the series of common species of *Volutilites* of the Upper Eocene or Oligocene beds of the Isle of Wight, the Hampshire coast, and the corresponding French, Austrian, and Belgian strata of the basins of Paris, Vienna, and Limbourg. In fact the *V. suturalis* and *V. cingulata* (varieties of our species) of the "Tongrien" or Lower Miocene beds of Lattorf, near Bernberg, is so exactly represented by a species which I have called *Voluta anticingulata* (M'Coy), that, on comparison of specimens with the tip of the spire absent, it would be almost impossible to separate them as the most trifling varieties; yet the European *V. cingulata* has the acute regular apex of the spire characteristic of the Eocene genus *Volutilites*, while our Australian representative form has the obtuse mammillated tip of the more recent true genus *Voluta*. In the same Lower Miocene or Oligocene on both sides of Hobson's Bay, we have great numbers of another species, the *Voluta anti-*

scalaris (M'Coy), which so completely resembles the *Volutilites scalaris*, equally common in the Isle of Wight and Hampshire cliff beds, that, on comparing specimens from the two localities, the nicest eye could scarcely find character for a variety, except the same generic difference of the acute regular tip to the spire in the European, and the obtuse mammillary tip in the Australian shell; and so with several others. None of these resemble living species, and they are accompanied by many others (as *V. Hannafordi* and *V. macroptera*, M'Coy) equally removed from any known living or fossil ones. In the same beds species of *Cypræa* are common, of the most extravagant forms when compared with any known living or fossil types. Thus one species, the *Cypræa gastroplox* (M'Coy), has the underside dilated into a flat circular plate between three and four inches in diameter. Another huge species, the *Cypræa gigas* (M'Coy), is commonly eight or nine inches in length, far exceeding any living species in size. Other Gasteropods are equally remarkable for representing fossil European species of the same age: thus the common *Cassidaria depressa* of the German Lower Miocene beds is so closely imitated by the *C. reticulospira* (M'Coy) in the Victorian strata, that the reticulation of the extreme apex of the spire is almost the only character for distinction. The common *Trivia avellana* of the European strata is represented by an equally common curiously similar species, the *T. avellanoides* (M'Coy). Amongst the singular forms in these Australian Tertiary beds, recalling Oolitic European ones, is a *Pleurotomaria* (*P. australis*, M'Coy) as large as the Mesozoic *P. anglica*, and a concentrically costated *Trigonia* (*T. semiundulata*, M'Coy) strongly contrasting with the radiated species which are alone found living now. The old notion, found in many books, that the marine Oolitic fauna, as well as the terrestrial, exists still in Australia in the modern times, has no definite foundation when closely examined. The genus *Trigonia* has often been quoted as a case in point of a genus common in old-world Mesozoic formations, not occurring in the Tertiaries, but found living in Australian waters. I have now described two Tertiary Australian abundant species, the above one, and a radiated species, the *T. acuticostata* (M'Coy), filling up the geological gap in the range in time of the genus, yet both perfectly distinct specifically from the four recent ones.

With these strange forms are abundance of a very small percentage of recent species, none of which, however, occur in Victorian waters, but in warmer seas, thus following the rule in this respect of recent species in Miocene strata in Europe being usually recent in some warmer latitude. All our evidence, in fact, goes to show that there was no glacial period in Victoria

succeeded by a warmer modern one, but that there has been a regular and gradual falling of the temperature to the present day.

The most abundant living shell in almost every locality of our Victorian Miocene or Oligocene beds is the *Pectunculus latirostus* of the warm seas of North New Zealand, found in thousands, and perfectly identical with the living one, though having no relation to any found in the seas of Australia. The *Cucullæa concamerata* and *granulosa* (Reeve), living in the warmer seas of southern China, but not found living south of the equator, is not uncommon in the fossil state in our Victorian Miocene beds. One of the commonest fossils in the same beds is the *Limopsis Belcheri*, previously only known as a very rare living species dredged from deep water off the Cape of Good Hope, where the Mozambique current heats the sea more than the latitude would account for. Almost equally common, however, and mixed with it, is the *Limopsis aurita* (Sassi), perfectly undistinguishable, on a minute comparison of specimens, from examples from the Coralline Crag of Suffolk and the Miocene Fahluns of Flonheim, Rheinhessen, or from living specimens from the seas of the northern hemisphere. The only other excessively common living species of shell in our Miocene or Oligocene beds is the *Corbula sulcata* (Lam.), of the tropical seas of the west coast of Africa, whence I have procured living specimens, so that, as in the other cases of identity of species spoken of, I might not run the chance of misleading my readers by erroneous identifications based on comparisons with figures or descriptions only.

The Brachiopoda, although not very abundant, present many representative and peculiar forms, with one doubtful recent species, and another certainly identical with the very rare *Rhynchonella lucida* (Gould), found living in the Sea of Japan. The Echinodermata are all extinct, and closely related to Maltese species. The corals are few and all extinct, and peculiar to the locality.

MESOZOIC PERIOD.

It is generally supposed that no marine Mesozoic strata occur in Australia. The announcement will therefore have some interest, that I have lately determined clearly the existence of the lower cretaceous rocks in nearly the centre of Australia, with the characteristic genera and closely representative species of the corresponding beds in Europe.

CRETACEOUS PERIOD.

From the head of the Flinders River Messrs. Carson and Sutherland have forwarded me specimens of an olive-coloured

argillaceous and sandy rock, containing two large species of *Inoceramus* (*I. Carsoni* and *I. Sutherlandi*, M'Coy), so nearly agreeing in size and shape with the English Cretaceous *I. mytiloides* (Sow.) and the English and French *I. Cuvieri* respectively, that at first sight they might be readily confounded. With these are two species of *Ammonites*, one (*A. Flindersi*, M'Coy) so closely agreeing in size, number of whorls, shape, markings, and septa with the common *Ammonites Beudanti* (Br.) of the French Lower Chalk, that, except for being slightly less compressed and a slight difference in some of the septal lobes, it could scarcely be separated, even as a variety.

With these is a Belemnite (*Belemnitella diptycha*, M'Coy) so exactly like in size and shape the *B. plena* of the English and French Lower Cretaceous rocks that they can only be distinguished by a slight difference in the distance of the two great longitudinal furrows.

The most wonderful occurrence which I am able to announce along with those molluscan forms are three new species of Enaliosaurian reptiles of Cretaceous genera, and most nearly allied to cretacean European species. One of these is an *Ichthyosaurus* (*I. australis*, M'Coy), of which I have recognized a large number of vertebræ, the large skull, with the eye and its bony sclerotic ring perfectly preserved, and part of one of the paddles. The other two are species of *Plesiosaurus*,—one (*P. macrospondylus*, M'Coy) differing from the nearest known species in the greater proportional length of the bodies of the vertebræ, and the other (*P. Sutherlandi*, M'Coy) more nearly approaching the ordinary proportions of the genus and the New-Zealand species of Owen.

LOWER MESOZOIC.

The coal-bearing rocks of Victoria belong, I have no doubt, to the Mesozoic period, from the characteristic plants being such as are found with the Mesozoic coal in Yorkshire, Germany, &c., and from the total absence of all the genera characteristic of the Palæozoic coal. At Cape Paterson and Bellerine we find in the shales alternating with the coal three well-marked species of *Zamites* (*Z. ellipticus* and *Z. Barklyi*, M'Coy, and a rarer species, *Z. longifolius*, M'Coy, which I have seen from the N.S.W. beds), a *Tæniopteris* (*T. Daintrei*, M'Coy) of the size and shape of the *T. vittata* of the English Oolitic coal-beds, but differing in the number of transverse veins in a given space, and the *Phyllothea australis*, identical with the New-South-Wales coal-species. The association of these genera alone would indicate the beds to be Mesozoic and not Palæozoic with certainty; but the association of the same plants with other species in other

localities furnishes much additional interesting information. Thus the *Phyllothea australis* is found with the *Glossopteris Browniana* in the New-South-Wales coal-beds of the Hunter River; so that, although the latter plant has not yet been found in Victoria, it is by this association brought to bear on our beds. Then, again, I have found the *Tæniopteris Daintrei* associated in New Zealand with a new species of *Camptopteris* (*C. Novæ Zealandiæ*, M'Coy); and thus by this association we get yet another Mesozoic genus of plants to support the view of the Mesozoic age of the Victorian coal. Besides these generic forms, so unlike those of Palæozoic coal, there are numerous species of *Pecopteris*, *Neuropteris*, *Sphenopteris*, and other genera having a greater range in time, and, as generic forms, therefore, of no interest in the discussion of the age of our coal-beds; but the species are generally nearly related to the Burdwan and Rajmahal coal-beds in India, and the Scarborough ones in the Oolitic series of England. One of these, found commonly near Bellerine (the *Pecopteris australis*), I have recently compared carefully with specimens of the English Oolitic *P. Whitbiensis*, and am convinced that there is no specific character to separate the Australian fossil, which at most can only rank as a slight variety incapable of definition. The Indian beds of Rajmahal, so closely related to the Australian coal-deposits near Sydney, are now, I believe, satisfactorily connected with the marine Mesozoic beds of that country containing Oolitic Ammonites, Belemnites, &c.

It is worthy of note that the collections illustrative of the coal-deposits of New South Wales sent to the Intercolonial Exhibition by the Rev. W. B. Clarke and Mr. Keene, having been carefully examined by myself in company with Mr. Selwyn, entirely fail to give the slightest support to the view of those gentlemen that the plant-beds and coal are there Palæozoic, as there is no trace of the *Sigillaria*, *Stigmaria*, *Calamites*, &c., said to be so abundant. The fish have the *facies* of Permian or Triassic forms rather than of Carboniferous, of which period the characteristic abundant forms *Psammodus*, *Cochliodus*, *Ctenoptychius*, *Gyracanthus*, *Rhizodus*, &c. are as completely absent as the Palæozoic plants in the plant-beds. Both in New South Wales and Victoria a *Lepidodendron* occurs, *but in beds* entirely below those we are speaking of. I some years ago determined the Oolitic age of some marine fossils, including *Pentacrinites*, *Belemnites*, *Ammonites*, &c., which had been sent from New-South-Wales localities to Mr. Clarke, and by him transmitted to His Excellency Sir H. Barkly, for my "opinion as to the geological epoch to which they belonged."

The sandstones of Bacchus Marsh, probably inferior in posi-

tion to the coal-beds, contain one plant often of the size, shape, and reticulated neuration of the *Glossopteris Browniana*, but without the midrib. For this I have proposed the name *Gan-gamopteris*; and of this generic form a species, *G. angustifolius* (M'Coy), occurs in New-South-Wales coal-plant beds along with the *Glossopteris Browniana*.

In all the marine Australian Mesozoic fossiliferous beds which I have seen, the genus *Trigonia* is absent.

TRIASSIC AND PERMIAN PERIODS.

I was able to suggest the existence of Trias deposits in Australia from the muschelkalk genus *Myaphoria*, which I recognized in some fossils from Wollumbilla sent by Mr. Clarke; and the Permian I suggested to exist at Mantuan Downs, also in New South Wales, from the *Productæ* and *Aulesteges* of that period submitted to me in the same collection.

CARBONIFEROUS PERIOD.

The sandstones of the Avon in Gippsland are the only traces of this formation that I can recognize in Victoria; and the only fossil I have seen from it is the *Lepidodendron* referred to above, identical with that recognized by me many years ago from New South Wales, and which I have lately seen also from Queensland.

DEVONIAN PERIOD.

It is with great pleasure I announce the fact of my having been able satisfactorily to determine the existence of this formation also in Australia, the limestone of Buchan in Gippsland containing characteristic corals, Placodermatous fish, and abundance of the *Spirifera levicostata*, perfectly identical with specimens from the European Devonian Limestones of the Eifel.

UPPER SILURIAN PERIOD.

I have been able to recognize the Mayhill Sandstones and the Wenlock rocks with certainty in many localities in Victoria. At Broadhurst Creek, for instance, the beds are filled with numbers of the *Phacops (Odontochila) longicaudatus*, exactly as the corresponding English beds of Cheney Longville are in Shropshire; and here, as in every part of the northern hemisphere, the *Spirifera reticulata* is the commonest Brachiopod; and many others identical with species of England, Bohemia, and North America occur with it.

The Ludlow rocks are indicated by the *Orthoceras bullatum* and a series of starfish closely representing those of the English Ludlow beds, together with a beautiful new *Homalonotus (H.*

Harrisoni, M'Coy), which I have named after the discoverer, as well as the *Graptolites Ludensis*. The *Hemithyris diodonta* (Dalm.) is as abundant in the Mayhill Sandstone of Victoria as in the corresponding English beds at Malvern; and the same appearance of oblong smooth *Pentamerus* (*P. australis*, M'Coy) marks this sandy base of the Upper Silurian in Victoria as in England and Wales and North America.

CAMBRIAN PERIOD OF SEDGWICK, LOWER SILURIAN OF
MURCHISON.

It is to this period that I have been able without hesitation to refer the whole of the slates containing gold-quartz veins or reefs in Victoria; and all the slates containing these gold-bearing veins are identical in age and character with those of North Wales, in which the Romans worked the gold-mines of Gogofau.

Not only are the majority of the fossil Graptolites found in the Welsh Llandeilo Flags and in the corresponding Cumberland and Scotch slates, also found in those beds in Victoria, but we have in these formations the most extraordinary proof of the unexpected fact which I announced on a former occasion, that there was in the Cambrian or Lower Silurian period a nearly complete specific uniformity of the marine fauna, not only over the whole northern hemisphere, but across the tropics, extending to this remote temperate latitude of the southern hemisphere.

In the slates of the gold-fields the principal fossils are Graptolites; and, what is very extraordinary, I have identified specifically here nearly the whole of the series of remarkable compound Graptolites first made known from the similar slates of Canada by the researches of Professor Hall. Many of the species have not yet been recognized in any but the Canadian localities in the northern hemisphere; and to find nearly the whole series here is most interesting, as their powers of locomotion could only be exercised in the short ovarian and free stage; so that, except on the supposition of a uniform marine fauna at this earliest zoological period of the earth's history, we could scarcely account for their width of distribution, and still less so of the littoral or shallow-water Mollusca which accompany them in other beds. The *Diplograpsus mucronatus* (Hall), so common in the Utica Slates of New York, I find in equal abundance here in the slates of Bendigo or Sandhurst, and with it abundance of the *D. quadrangularis* (M'Coy), completely identical with those I described many years ago from the slates of Dumfriesshire. The *Diplograpsus pristis* (His., sp.) also occurs in these same slates, mixed with the others as in Sweden, Bohemia, and Scotland; but in certain different sandy beds it covers the

whole of the planes of deposition in millions, to the exclusion of everything else, exactly as it does in certain beds of the English Caradoc Sandstone near Church Stretton. In some localities these are replaced by great numbers of the Bohemian *Diplograpsus palmeus* (Barrande), on the upper end of many specimens of which I find a large, smooth, pear-shaped or heart-shaped appendage which I believe to be an ovarian vesicle. I should remark that I have observed exactly the same appendage (bearing out, I think, the idea, which I have supported formerly on other grounds*, of the affinity of the Graptolites with the Hydroida) in specimens of this species from the slates of the typical locality in Bohemia, when carrying out the direct careful comparisons of specimens of species which I state to be identical in Victoria and other countries; so the frequent observation of this apparent ovicell in the Victorian specimens does not at all affect the identity of this species with that of the basin of Bohemia, of which there can be no doubt. The *D. ramosus* (Hall) in our slates is also identical with those of the Utica Slate of New York. Of the group of compound Canadian Graptolites, the commonest in the Victorian gold-field slates of many localities is the *Didymograpsus caduceus* (Salt.), first described from the Quebec Slates. In many localities the specimens of this species are as small as the first-described Canadian ones; but in others they acquire a greatly increased size, occasionally twice the length and nearly three times the width; and the angle of divarication of the two branches varies from 5° to 70° . This is usually accompanied by the *D. serratulus* (Hall), identical with those of the New York Slates, and generally also by the very large Canadian *D. bryonoides* (Hall), which it is possible may be hereafter found to be the perfect development of my *G. latus*. The *D. nitidus* (Hall) is more rare, but perfectly identical with the Canadian types. The *Graptolites gracilis* (Hall), identical with the New-York and Canadian species, is one of the rarer compound forms. The curious radiating compound forms, which created so much astonishment when published first by Professor Hall in his Decades of the palæontology of this part of Sir H. Logan's Geological Survey of Canada, I find in just as great abundance in the slates of the same age in Victoria. *D. octobrachiatus*, *D. quadribrachiatus*, and *D. Logani* (Hall) are, especially the latter, not uncommon in many of the gold-field localities. The curious Canadian quadrifid Graptolite, named *Phyllograptus typus* by Hall, is one of our most abundant Australian Graptolites; but, although sometimes upwards of an inch in length, small specimens, I find, on comparison with Swedish specimens of the *G. folium* of Hisinger, are perfectly identical therewith; and,

* British Palæozoic Rocks and Fossils.

further, on carefully comparing Bohemian specimens of the *G. ovatus* of Barrande with the Swedish *G. folium*, I have no doubt they belong to one variable species, and are identical with the smaller examples of the Australian and Canadian species, and, further, that the European specimens are truly quadrifoliate, like Hall's *Phyllograptus*; and in this way the difference in the different descriptions, as to the width of the midrib, becomes intelligible.

As a general rule, the Graptolite-slates in every part of the world contain no other fossils. I many years ago discovered in Wales, near Builth, the only shell I ever heard of in Graptolite-slates (the *Siphonotreta micula*, M'Coy); and I was greatly surprised to recognize it also in Victoria, in the Deep Creek section. The Crustacean genus *Hymenocaris* is represented by a new species, *H. Salteri* (M'Coy), found in most of the Graptolite-slate localities.

In a different set of sandy, marly, and mud-stone beds (as at Woori Yallock, Yarra) we find:—an extensive series of the genera and many of the species of Corals, Trilobites, and Mollusca of the "Bala beds" of North Wales; species of *Favosites**, *Palæopora*, *Calymene*, *Phacops*, *Beyrichia*, *Strophomena*, *Leptagonia depressa*, *Spirifera reticularis*, *Orthis elegantula*, the characteristic little genus *Cucullella*, *Murchisonia*, *Conularia*, &c.; and some species new, and some identical with British ones, forming a group so completely reproducing the well-known Bala beds as to afford a second case in support of the view of the general specific identity of the marine fauna over both hemispheres of the whole world in the earliest palæozoic times.

It is curious that I have not yet seen any trace of the genus *Trinucleus* in Australian beds, nor *Ampyx*, while all the above-mentioned genera of Trilobites, with *Acidaspis*, *Chirurus*, &c., are well marked.

I can scarcely close this part of the subject without drawing attention to the curious confirmation offered in Victorian geology of the view of Professor Sedgwick and myself, that there was a real systematic line of division between the Upper Silurian and the Cambrian and Lower Silurian, at the base of the Mayhill Sandstone and over the Caradoc Sandstone—the Mayhill Sandstone, which we first defined and demonstrated to have Upper-Silurian fossils only, and the true Caradoc Sandstone full exclusively of Lower-Silurian or Cambrian types,—the previous confusion of these two sandstones, from the erroneous mingling

* It is worthy of remark that as on the continent of Europe the Devonian genus *Pleurodictyum* has now been found in Silurian strata, so in those beds in Victoria I find a new species (*P. megastoma*, M'Coy), with cells half an inch in diameter.

of their fossils in collections, having given Sir Roderick Murchison the erroneous impression that his Upper and Lower Silurian groups of fossils (the distinctness of which he himself was the first to point out) were mixed together in the Caradoc Sandstone, and that consequently the Bala beds, identical in fossils with those of the Caradoc beds (although formerly recognized by him as the type of the Cambrian system), could not be separated palæontologically from the Upper Silurian group. The Mayhill Sandstone was one of the first formations I recognized, on landing near Melbourne, with the usual Upper-Silurian fossils; and it is now found here, as in Wales, to be slightly unconformable to the Cambrian or Lower Silurian, forming the obvious base of the former and totally distinct from the latter.

XXIII.—*Notes on Spiders, with Descriptions of several Species supposed to be new to Arachnologists.* By JOHN BLACKWALL, F.L.S.

Tribe Octonoculina.

Family MYGALIDÆ.

Genus FILISTATA, Walck.

Filistata distincta, n. sp.

Length of the male (not including the falces) $\frac{7}{16}$ of an inch; length of the cephalothorax $\frac{3}{16}$, breadth $\frac{3}{20}$; breadth of the abdomen $\frac{1}{6}$; length of an anterior leg $1\frac{1}{3}$; length of a leg of the third pair $1\frac{5}{8}$; length of a palpus $1\frac{3}{4}$.

The cephalothorax is oval, clothed with yellowish-grey hairs, moderately convex, with a longitudinal indentation in the medial line, and an abrupt prominence in the cephalic region, on which the eyes are seated, the space between the prominence and the frontal margin being sloped forwards; its colour is brownish yellow, the medial region being the darkest. The falces are small, subconical, prominent, united at the base, somewhat hollowed on the inner surface, armed with a very short, curved, red-brown fang, and have a pointed tooth near their extremity, on the inner side; the maxillæ, which are strongly curved towards the lip, have the palpi articulated on the outer side, nearer to their extremity than their base; the lip is long, and somewhat pointed at its apex; and the sternum is oval and hairy. These parts have a brownish-yellow hue, the falces, which are rather the darkest-coloured, being tinged with red at the extremity. The eyes are closely grouped on the cephalic prominence, and are diaphanous; three on each side, of an oval figure, form an irregular triangle, the anterior ones being the